

Review Problems

1. Simplify each of the following.

a) $\ln\left(\frac{1}{e^2}\right)$

d) $\log_{10} 0.0001$

g) $5^{\log_{25} 20} - (e^2)^{\ln 3} + e^{\ln 5}$

b) $3^{\log_9 m}$

e) $\log_8\left(\frac{1}{16}\right)$

h) $\frac{\sin 15^\circ}{\cos 75^\circ} + \left(\frac{1}{3}\right)^{-2} + \cos 10^\circ + \cos 170^\circ$

c) $8^{\log_2 10}$

f) $4^{\log_2 p} \cdot e^{-\ln p} - \log_{10} 100$

2. Which of the following is NOT equivalent to $x^{-8/3}$?

A) $\frac{1}{(\sqrt[3]{x})^8}$

B) $\frac{1}{\sqrt[3]{x^8}}$

C) $\frac{1}{x^2 \sqrt[3]{x^2}}$

D) $\frac{\sqrt[3]{x}}{x^3}$

E) $\sqrt[3]{-x^8}$

3. a) The number of bacteria increased by 6% overnight. If this morning there are 26 457 600, how many were there last night?

b) The number of bacteria increased by 60% overnight. If this morning there are 26 457 600, how many were there last night?

c) The number of bacteria increased by 160% overnight. If this morning there are 26 457 600, how many were there last night?

4. Find the exact values of all trigonometric functions of β if we know that $\cos \beta = -\frac{12}{13}$ and β is not in the third quadrant.

5. Which of the following is NOT equal to $\sin \alpha$?

A) $\sin(\alpha + 360^\circ)$

B) $\sin(\alpha + 180^\circ)$

C) $\sin(180^\circ - \alpha)$

D) $\cos(90^\circ - \alpha)$

6. Which of the following is NOT equal to $\cos \alpha$?

A) $\cos(\alpha + 360^\circ)$

B) $\cos(-\alpha)$

C) $\cos(180^\circ - \alpha)$

D) $\sin(90^\circ - \alpha)$

7. Which of the following is NOT equal to $\tan \alpha$?

A) $\tan(\alpha + 360^\circ)$

B) $\tan(\alpha + 180^\circ)$

C) $-\tan(180^\circ - \alpha)$

D) $\tan(90^\circ - \alpha)$

8. Find the exact value of $\sin x \cos x$ if $\tan x = 4$.

9. Solve each of the following equations.

a) $\log_3(4x - 1) = -2$

e) $2^{x-4} + 5 = 1$

i) $\tan^4 x = 3 \tan^2 x$

b) $\ln(2x + 5) = 3$

f) $\log_x 10 = 2$

j) $-4 \cos x = 4 + \sin^2 x$

c) $10^{3x-1} = 7$

g) $\cos x + \cos x \tan x = 0$

k) $\cos^2 x = \frac{1}{2}$

d) $3e^{-2x+1} - 4 = 11$

h) $1 - \sin x = 2 \cos^2 x$

l) $\sin x = -\cos x$

10. Find the domain for each of the following functions.
- a) $f(x) = \ln(\cos^2 x)$ d) $f(x) = \sqrt{x-2} - \sqrt{5-x}$ g) $f(x) = \log_{10}(6x - x^2) + \sqrt{x-3}$
- b) $f(x) = \frac{2x-3}{\log_2(x-3) - 1}$ e) $f(x) = \ln(x^2 - 3x)$
- c) $f(x) = \frac{\sin x}{x^2 + 10}$ f) $f(x) = \cot x$
11. A point P is located 15 units away from the center of a circle with radius 8 units. Find an approximate value of the angle formed by the two tangent lines drawn to the circle from P .
12. Find both coordinates of all points where the following graphs intersect each other.
- a) $x^2 + (y-4)^2 = 25$ and $(x-6)^2 + (y-1)^2 = 10$
- b) $(x+2)^2 + (y+2)^2 = 5$ and $(x-2)^2 + y^2 = 5$
- c) $(x+5)^2 + (y-3)^2 = 13$ and $(x-4)^2 + (y+3)^2 = 52$
13. Suppose that p and q are real numbers such that p is twenty less than twice q . Find the smallest value of a) $p^2 + q^2$ b) pq
14. The angles of a triangle are consecutive elements of an arithmetic sequence. What can we state about this triangle?
15. Find all values of the parameter p for which the equation $(x-p)(x+p) + 9 = 2(3x+p)$ has exactly
- a) one real solution for x . b) has no real solutions for x . c) has two real solutions for x .

Review Problems - Answers

- 1.) a) -2 b) \sqrt{m} c) 1000 d) -4 e) $-\frac{4}{3}$ f) $p-2$ g) $\sqrt{20}-4$ h) 10
- 2.) E 3.) a) 24 960 000 b) 16 536 000 c) 10 176 000
- 4.) $\sin \beta = \frac{5}{13}$, $\cos \beta = -\frac{12}{13}$, $\tan \beta = -\frac{5}{12}$, $\csc \beta = \frac{13}{5}$, $\sec \beta = -\frac{13}{12}$, $\cot \beta = -\frac{12}{5}$
- 5.) B 6.) C 7.) D 8.) $\frac{4}{17}$
- 9.) a) $\frac{5}{18}$ b) $\frac{1}{2}(e^3 - 5)$ c) $\frac{1}{3}(1 + \log_{10} 7)$ d) $\frac{1}{2}(1 - \ln 5)$ e) no solution f) $\sqrt{10}$
- g) $\frac{\pi}{2} + k\pi$, $-\frac{\pi}{4} + k\pi$, $k \in \mathbb{Z}$ h) $\frac{\pi}{2} + 2k\pi$, $-\frac{\pi}{6} + 2k\pi$, $-\frac{5\pi}{6} + 2k\pi$, $k \in \mathbb{Z}$ i) $k\pi$, $\pm\frac{\pi}{3} + k\pi$, $k \in \mathbb{Z}$
- j) $\pi + 2k\pi$, $k \in \mathbb{Z}$ k) $\pm\frac{\pi}{4} + k\pi$, $k \in \mathbb{Z}$ l) $-\frac{\pi}{4} + k\pi$, $k \in \mathbb{Z}$
- 10.) a) $x \neq \frac{\pi}{2} + k\pi$, $k \in \mathbb{Z}$ b) $x > 3$ and $x \neq 5$ c) \mathbb{R} d) $2 \leq x \leq 5$ e) $x < 0$ or $x > 3$
- f) $x \neq k\pi$, $k \in \mathbb{Z}$ g) $3 \leq x < 6$ 11.) 64.46191° 12.) a) $(5, 4)$ and $(3, 0)$ b) $(0, -1)$ c) $(-2, 1)$
- 13.) a) 80 when $q = 8$ and $p = -4$ b) -50 when $q = 5$ and $p = -10$ 14.) one angle is 60°
- 15.) a) 0 and -2 b) $(-2, 0)$ c) $(-\infty, -2) \cup (0, \infty)$